IN THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Currently Amended) An optical head device, comprising:

a blue laser light source for emitting a blue light beam;

an infrared laser light source for emitting an infrared light beam;

an objective lens for receiving light beams emitted from the blue laser light source and the infrared laser light source and focusing them into a spot on a recording surface of an optical disk; and

an optical detector in which is formed an optical detector portion for receiving a light beam reflected by the recording surface of the optical disk and outputting an electric signal that corresponds to a light amount of the light beam;

wherein, due to the objective lens, the blue light beam emitted by the blue laser light source is focused into a spot on the recording surface of an optical disk after passing through a substrate having thickness t1, wherein t1 is [[of]] approximately 0.1 mm or less ~~thickness~~;

wherein a relay lens is disposed between the infrared laser light source and the objective lens; [[and]]

wherein the infrared light beam emitted from the infrared laser light source is converted by the relay lens so that the infrared light beam exiting the relay lens converges to have a smaller diameter than the infrared light beam incident on the relay lens and then, as the infrared light beam diverges once again, the infrared light beam is incident on the objective lens, and the objective lens focuses the infrared light beam into a spot on the recording surface of an optical disk, after passing through an approximately 1.2 mm substrate;

wherein the objective lens is a compound objective lens composed of a hologram and a refractive lens;

wherein the hologram comprises a grating having a sawtooth cross-sectional shape formed on at least an inner circumferential portion;

wherein a depth h1 of the sawtooth cross-sectional shape is

a depth that generates a positive second-order diffraction light by providing a light path difference of approximately two wavelengths with respect to a first light beam having wavelength λ1 in the range of 390 nm to 415 nm, and

a depth that generates a positive first-order diffraction light with respect to a second light beam having wavelength λ2 in the range of 630 nm to 680 nm;

wherein the hologram has a convex lens form so that if the first light beam is focused passing through a substrate having thickness t1, the first light beam is subjected to a convex lens effect by the hologram, a change in a focal length is reduced if the wavelength λ1 changes by about several nm;

wherein the positive second-order diffraction light of the first light beam is focused after passing through a substrate having thickness t1, and the positive first-order diffraction light of the second light beam that passes through the inner circumferential portion of the hologram is focused after passing through a substrate having thickness t2;

wherein $t1 < t2$; and

wherein if the first light beam is focused passing through a substrate having thickness t1, then

by having the hologram exert a greater convex lens effect than if the second light beam that passes through the inner circumference portion of the hologram is focused passing through a substrate having thickness t2, or

by having the hologram exert a smaller convex lens effect when the second light beam that passes through the inner circumference portion of the hologram is focused passing through a substrate having thickness t2 than when the first light beam is focused passing through a substrate having thickness t1,

a focal position on an optical disk side is moved away from the compound objective lens.

2. (Currently Amended) The optical head device according to claim 1,

wherein the relay lens adds spherical aberration at its outer circumference portion away from [[the]] an optical axis, and due to the spherical aberration, corrects off-axial aberration.

3. (Original) The optical head device according to claim 1,

wherein a distance between the relay lens and a point of convergence on a side opposite a point of emission of the infrared light beam is shorter than a distance between the relay lens and the point of emission of the infrared light beam.

4. (Original) The optical head device according to claim 1, further comprising:

a dichroic element, for separating the infrared light beam and shorter wavelength light beams, between the relay lens and the objective lens.

5. (Original) The optical head device according to claim 4,

wherein a dichroic film for separating the infrared light beam and shorter wavelength light beams is formed on a surface of a parallel flat plate provided in the dichroic element disposed between the relay lens and the objective lens.

6. (Original) The optical head device according to claim 5,

wherein a thickness of the parallel flat plate is 1 mm or less.

7. (Original) The optical head device according to claim 4,

wherein the dichroic element is disposed at a position where the blue light beam is a substantially parallel light beam.

8-9. (Cancelled)

10. (Currently Amended) The optical head device according to claim [[9]] 1,

wherein positive first-order diffraction light of the second light beam that passes through an outer circumferential portion of the hologram has aberration when it has passed through a substrate having ~~whose substrate~~ thickness [[is]] t2, and is not focused.

11. (Cancelled)

12. (Currently Amended) The optical head device according to claim [[9]] 1,

wherein when focusing the second light beam onto the recording surface of [[an]] the optical disk after passing through a substrate ~~whose substrate~~ having thickness [[is]] t2, a collimating lens for turning the second light beam that is emitted from the second light source into substantially parallel light is moved toward the second light source so that the second light beam is turned into slightly diverged light and made incident on the objective lens, moving the focal position on the optical disk side away from the compound objective lens.

13. (Currently Amended) The optical head device according to claim [[9]] 1, further comprising:

a phase step in which is formed a step difference that causes a light path length difference of five times the wavelength with respect to the blue light beam and three times the wavelength with respect to the second light beam.

14. (Currently Amended) The optical head device according to claim [[8]] 1,

wherein the hologram and the objective lens are fixed as a single unit.

15. (Currently Amended) The optical head device according to claim [[8]] 1,

wherein the hologram is formed integrally with the surface of the objective lens.

16. (Original) An optical information device comprising:

an optical head device;

a motor for rotating an optical disk; and

an electric circuit for receiving signals obtained from the optical head device, and based on the signals, for controlling and driving the motor and the objective lens and the laser light sources of the optical head device;

wherein the optical head device is the optical head device according to claim 1.

17. (Previously Presented) An optical information device comprising:

an optical head device;

a motor for rotating an optical disk; and

an electric circuit for receiving signals obtained from the optical head device, and based on the signals, for controlling and driving the motor and the objective lens and the laser light sources of the optical head device;

wherein the optical head device is the optical head device according to claim 12, and

wherein different types of optical disks are distinguished between, and the collimating lens is moved toward the second light source in the case of optical disks whose substrate thickness is 0.6 mm.

18. (Original) A computer comprising:

an optical information device;

an input device or an input element for inputting information;

a computing device for carrying out computing based on information input from the input device or information reproduced from the optical information device; and

an output device or an output element for displaying or outputting information input from the input device, information reproduced from the optical information device, or the results of the computation performed by the computing device;

wherein the optical information device is the optical information device according to claim 16.

19. (Original) An optical disk player comprising:

an optical information device, and

a decoder for converting into an image information signals obtained from the optical information device from information to be converted into an image;

wherein the optical information device is the optical information device according to claim 16.

20. (Original) A car navigation system comprising:

an optical information device, and

a decoder for converting into an image information signals obtained from the optical information device from information to be converted into an image;

wherein the optical information device is the optical information device according to claim 16.

21. (Original) An optical disk recorder comprising:

an optical information device, and

an encoder for converting into information image information from an image to be converted into information to be recorded by the optical information device;

wherein the optical information device is the optical information device according to claim 16.

22. (Original) An optical disk server comprising:

an optical information device, and

an input/output element for exchanging information with the outside;

wherein the optical information device is the optical information device according to claim 16.

23-35. (Cancelled)